Appendix G

I. Introduction

The Nature Conservancy and the Environmental Defense Fund (TNC&EDF) have proposed a novel and innovative alternative (Alternative 11) for minimizing adverse impacts to essential fish habitat. It combines the use of two management techniques: establishment of marine reserves and the use of a trawl buyback program. The December 10, 2004 TNC&EDF proposal (Analysis of Alternative 11 to Minimize Adverse Impacts to Essential Habitat: Buyout and Establishment of No-Trawl Zones off the Central California Coast) is attached to the DEIS as Appendix F. Specifically, TNC&EDF have proposed the following:

> The project aims to protect biodiversity and promote recovery of groundfish stocks through the establishment of large no-trawl zones in federal waters between Point Conception and Davenport. The no-trawl zones would include benthic habitats (hard, soft, and mixed substrates in several depth ranges), biogenic systems as well important benthic features such as submarine canyons, seamounts, the shelf-slope break, and offshore reefs and banks that are important components of EFH for multiple species of groundfish and their various life stages. These no-trawl zones should comprise a significant but yet-to-be determined percentage of the project's geographical area. This proposal aims to protect representative seafloor habitats at sites currently not impacted by bottom trawling and to allow previously trawled areas to recover.
>
> Our project approach would be to purchase a significant majority of the bottom trawling permits and vessels and perhaps processors in the region in exchange for a significant portion of the project area designated as no-bottom trawl zones. The no-trawl zones would be sited using a participatory process with the goal of maximizing conservation gains while minimizing adverse socio-economic impacts on processors and fishermen and their workforces. We intend to work closely with the residual fleet to identify key fishing grounds that would remain open for bottom trawling.

II. Alternative Objective and Description

<u>Alternative Objective</u>

In its September 2004 Report "White Paper Marine Reserves: Objectives, Rationales, Fishery Management Implications, and Regulatory Requirements, the Pacific Fishery Management Council's Science and Statistical Committee stress:

> In considering reserves as a management measure, it is important that the management objectives be the starting point for discussion.

> The management objectives addressed by the proposal should be described in specific terms and in the context of relevant mandates. The proposal should describe the problem to be addressed, why the problem is significant and why the *status quo* is inadequate to address the problem.

Although TNC&EDF refer to "no-trawl zones", according to the SSC the Council's definition of a marine reserve is the following:

> The Pacific Fishery Management Council defines a marine reserve as "an area where some or all fishing is prohibited for a lengthy period of time" (http://www.pcouncil.org/reserves/reservesback.html). This definition reflects the Council's area of regulatory authority (fishing) and encompasses but is not limited to permanent or no-take closures. Other definitions of a marine reserve exist that vary in terms of the nature of activities restricted, the degree of allowable use and the duration of closure.[1] There does not appear to be a uniformly accepted definition of what constitutes a marine reserve.

Thus, the TNC&EDF proposal aligns with three of the major objectives (2, 3, and 5) that the SSC categorizes as major objectives of establishing a marine reserve:

> 1. *Reserves as insurance policy* — Reserves are uniquely qualified to provide a complete age structure for target species and thereby enhance persistence, i.e., the ability of fish stocks to withstand adverse effects associated with environmental variability and management uncertainty and error. In this sense, reserves have significant potential as a tool for mitigating uncertainty in stock assessments and managing unassessed stocks.
>
> 2. *Reserves as source of fishery benefits* — Recent studies suggest that the protection of age structure provided by reserves may increase recruitment and population resilience. On the other hand, theoretical models that are used to demonstrate increases in fishery yield outside the reserve are sensitive to underlying assumptions regarding the behavior of fish stocks, the extent of exploitation prior to the reserve, and the extent of effort redistribution after the reserve is established. While such models provide insights into how particular circumstances and processes might affect yield, the practical question of how well model assumptions apply to particular fish stocks remains largely unanswered. Moreover, while the literature typically characterizes fishery benefits in terms of increases in yield, economic and social effects often matter more than yield to fishery participants and fishing communities.
>
> 3. *Reserves as source of ecosystem benefits* — Cessation of fishing may yield ecosystem benefits (including protection or enhancement of habitat) within the reserve, depending on the nature and extent of fishing prior to reserve establishment. However, in evaluating more general ecosystem effects of reserves, it is important to consider effects both inside and outside the reserve, as the ecosystem itself extends to both areas. Reserves are a potentially useful tool

for providing ecosystem benefits, provided that effects of effort displacement on the ecosystem outside the reserve are also managed effectively.

4. *Reserves as means of achieving social objectives* — Reserves may be used to achieve objectives such as reducing social conflict among user groups, accommodating values held by various segments of the public, discouraging or encouraging particular types of resource use, or protecting areas that are deemed unique in terms of cultural or natural heritage. This objective differs fundamentally from the other reserve objectives in that the choice of criteria to evaluate achievement of this objective is a matter of policy rather than science. However, social science can be useful for evaluating management alternatives relative to the policy criteria.

5. *Reserves as opportunities to advance scientific knowledge or to establish reference sites* — Reserves can allow scientists to evaluate the impacts of fishing on marine communities by comparing fished areas to protected areas inside a reserve. However, the SSC notes that fish populations inside and outside a reserve are not isolated from each other and are best studied as a system. In addition, most research reserves will not be designed primarily for research purposes. Caution must be used in generalizing from experimental observations to broad conclusions about reserve effects. Usefulness of study results depends largely on study design. Proposals for research reserves should be evaluated on the same basis as other types of research proposals. Sound research should be accommodated and encouraged even at reserves that are not established primarily for that purpose, to augment existing knowledge regarding biological, socioeconomic and ecological effects.

With respect to defining the problem, the TNC&EDF cite the National Academy of Sciences and other studies:

Bottom-trawling has become a source of concern because of the size of the affected fishing grounds, the modification of the substrate, disturbance of benthic communities and removal of non-target species (NRC 2002). One study suggests that a typical trawl fishery in northern California trawls the seafloor about 1.5 times per year, with some areas being trawled as much as 3 times per year. Considering the slow recovery times of these benthic communities, this level of disturbance is sufficient to result in a vastly altered community (Friedlander et al., 1999). The repeated use of bottom-tending gear such as trawls can cause long-term biological and physical changes in the marine environment (depending on the substrate type, abundance of habitat-forming invertebrates like corals and sponges and other factors) that can be orders of magnitude greater in intensity and spatial extent than natural disturbances (Watling & Norse.)

In its 2001 Report “California Living Marine Resources: A Status Report,” The California Department of Fish and Game state (page 37)

There is growing evidence that fishing has a significant impact on coastal habitats. For example, the complexity of the marine habitat can be altered by the scraping, shearing, and crushing effects of fishing gear. Physical effects of trawling include plowing and scraping of the sea floor and resuspension of sediments. Resulting benthic troughs can last as little as a few hours or days in mud and sand sediments over which there are strong tides or currents, to between a few months to over five years in sea beds with a mud or sandy-mud substrate at depths greater than 100 meters with weak or no current flow. Longline gear has similarly been observed to shear marine plants and sessile organisms from the bottom. Pot gear may damage demersal plants and animals as it settles, and longlined pots may drag thorough and damage bottom fauna during gear retrieval. Boat anchors also can inflict serious, though localized, damage in some areas.

In addition to directly altering the bottom habitat, fishing can result in lost gear that is left to "ghost fish," thereby causing additional habitat alterations. Fishing activities also affect the water column through discharge of offal from fish processed at sea. These discards in deeper water could redistribute pretty food away from midwater and bottom-feeding organisms to surface-feeding organisms; in low-current environments, these discharges can decompose and create anoxic bottom conditions. The water column also can be impacted by fuel leaks from fishing boats.

Measures to minimize these impacts include prohibiting the use of damaging gear in sensitive areas and modifying gear so that damage to bottom habitats is minimized.

The Pacific Council in its EIS documents makes similar statements:

It is likely there are few, if any, large virgin marine habitats off the Pacific coast. Due to the high relief, rocky nature of Pacific coast bottom habitat, however, there may be pockets of habitat that have undergone few alterations by trawl gear. High relief rock piles that are not accessible to trawl gear are usually accessible to commercial longline and recreational hook-and-line gear. Similarly, marine canyons that have not been trawled may be used by commercial longliners. The Pacific coast groundfish species mix, with a high proportion of rockfish, is evidence that there are several remaining complex habitat areas. The numerous, long-lived rockfish species have evolved to take advantage of varied rock habitats along the length of the coast. As rockfish stocks have been fished down to lower levels, there is little evidence of new increases in stocks of short-lived species that do not rely on high habitat complexity. Thus, alterations to rockfish habitat may not be accompanied by improvements in stocks that are better adapted to the altered habitat. For this reason, protection of rockfish and rockfish habitat is extremely important to long-term sustainability of the groundfish fishery.

> *Trawl gear, particularly doors and foot ropes, can alter marine habitat complexity. Changes to physical characteristics of the sea floor would include leveling of rock formations, re-suspending sediments, and other disturbances. These effects depend on towing speed, substrate type, strength of tides and currents, and gear configuration (Jones 1992). It has been found that otter doors tend to penetrate the substrate one cm to 30 cm; one cm on sand and rock substrates, and 30 cm in some mud substrates (Brylinsky et al. 1994; Jones 1992; Krost et al. 1990). Another factor that will cause variation in the depth of the troughs made by the otter doors is the size (weight) of the doors (i.e., the heavier the doors the deeper the trough) (Jones 1992). These benthic troughs can disappear in as little as a few hours or days in mud and sand sediments over which there is strong tide or current action (Caddy 1973; Jones 1992), or they can last much longer, from between a few months to over five years in seabeds with a mud or sandy-mud substrate at depths greater than 100 m with weak or no current flow (Brylinsky et al. 1994; Jones 1992; Krost et al. 1990). Footropes that are designed to roll over the sea floor cause little physical alteration other than smoothing the substrate and minor compression (Brylinsky et al. 1994; Kaiser and Spencer 1996). However, since a trawler may re-trawl the same area several times, these minor compressions can cause a "packing" of the substrate (Schwinghamer et al. 1996). Further compression of the substrate can occur as the net becomes full and is dragged along the bottom. Trawl gear used off the West Coast is often modified with a "roller gear" footrope, where rubber tires are packed together along the footrope, allowing the base of the net to bounce along the bottom, or to drag over obstructions without snagging the net. Development of roller gear has allowed trawlers to work in formerly inaccessible rocky areas. Research in the Gulf of Alaska on the impacts of roller gear on bottom habitat may soon provide documentation on the effects of this gear on bottom habitat (Heifetz 1997). Whatever the direct habitat impacts of roller gear may be, roller gear is effective in allowing trawlers to work in formerly inaccessible, rocky areas.*

The TNC&EDF want to protect the California Coast area from Point Conception to Davenport California including offshore seamounts from potential negative effects from bottom trawling because:

> This area was selected because of its incredible biological diversity and ecological value. The presence of large canyons near shore creates high bathymetric complexity and habitat complexity. It contains nearly the full range of habitat types found on the continental shelf and slope, including estuaries, nearshore rocky reefs, kelp forests, highly diverse soft and mixed bottom habitats, deep canyons and near-shore canyon heads, offshore banks, upwelling and seamounts. These diverse habitat types are critical for support of a correspondingly rich array of species, including 21 cetacean species, 6 pinniped species, 184 species of shore and sea birds, and hundreds of fish and invertebrate species. In addition, there is evidence suggesting that benthic biodiversity peaks in upwelling zones at the shelf/slope break of 200-300 m of water in this area.

The project boundaries from Point Conception to Davenport and down to 3000 meters were chosen for two reasons.

> First, the Monterey Bay National Marine Sanctuary and areas south to Point Conception are ecologically and biologically important and unique. The area supports multiple and viable examples of important ecosystems, communities, species and essential fish habitat across environmental gradients. Many of these areas are considered important for growth, reproduction or survival of many species due to their role as nursery grounds, critical habitats or topological features around which mobile animals aggregate. Nowhere else along the Pacific west coast supports the abundance and diversity of near-shore canyons, ledges, and canyon heads.
>
> Secondly, the area is a good representation of the historical fishing grounds for bottom trawlers who port in Avila, Morro Bay, Monterey, Moss Landing and Half Moon Bay. While the project boundary does not represent their entire fishing area, it is likely to cover the great majority of it.

According to TNC&EDF, the primary conservation and management objectives of this alternative are to recover groundfish stocks, protect essential fish habitat, to conserve and protect biodiversity, and to provide "…a unique "living laboratory" for scientific research opportunities aimed at objectively determining the impacts, if any, on dragging the seafloor in the Central Coast of California." To achieve these objectives, TNC&EDF are undertaking a participatory process with the industry and the Council where maps that reflect "Conservation value" as defined by TNC&EDF (Figure 4 of Appendix F to the DEIS, groundfish habitat value as defined by the NOAA Groundfish Habitat Suitability Probability database (Figure 5 & 6 of Appendix F to the DEIS), and maps showing trawl fishing effort (such as Figure 4-22 of this DEIS) will form the basis of the negotiations with the industry and the Council. It should be noted that "Conservation Value" as defined by TNC&EDF is based on more than groundfish. It is based on protecting, depending on the conservation target and its measurement unit (See Appendix 2 to the TNC&EDF proposal) various range of shoreline types (e.g., gravel and sand pits) ecosystem communities (e.g. dunes and kelp beds), biologically significant areas (e.g. upwelling zones and seamounts), structure forming invertebrates (corals, anemones and sponges, fish (e.g. groundfish and salmon), birds (e.g. terns and cormorant), other animals (e.g. sea lions and otters), and various types of benthic habitat (e.g. hard slope and rocky shelf.)

Figure 4. Conservation Value

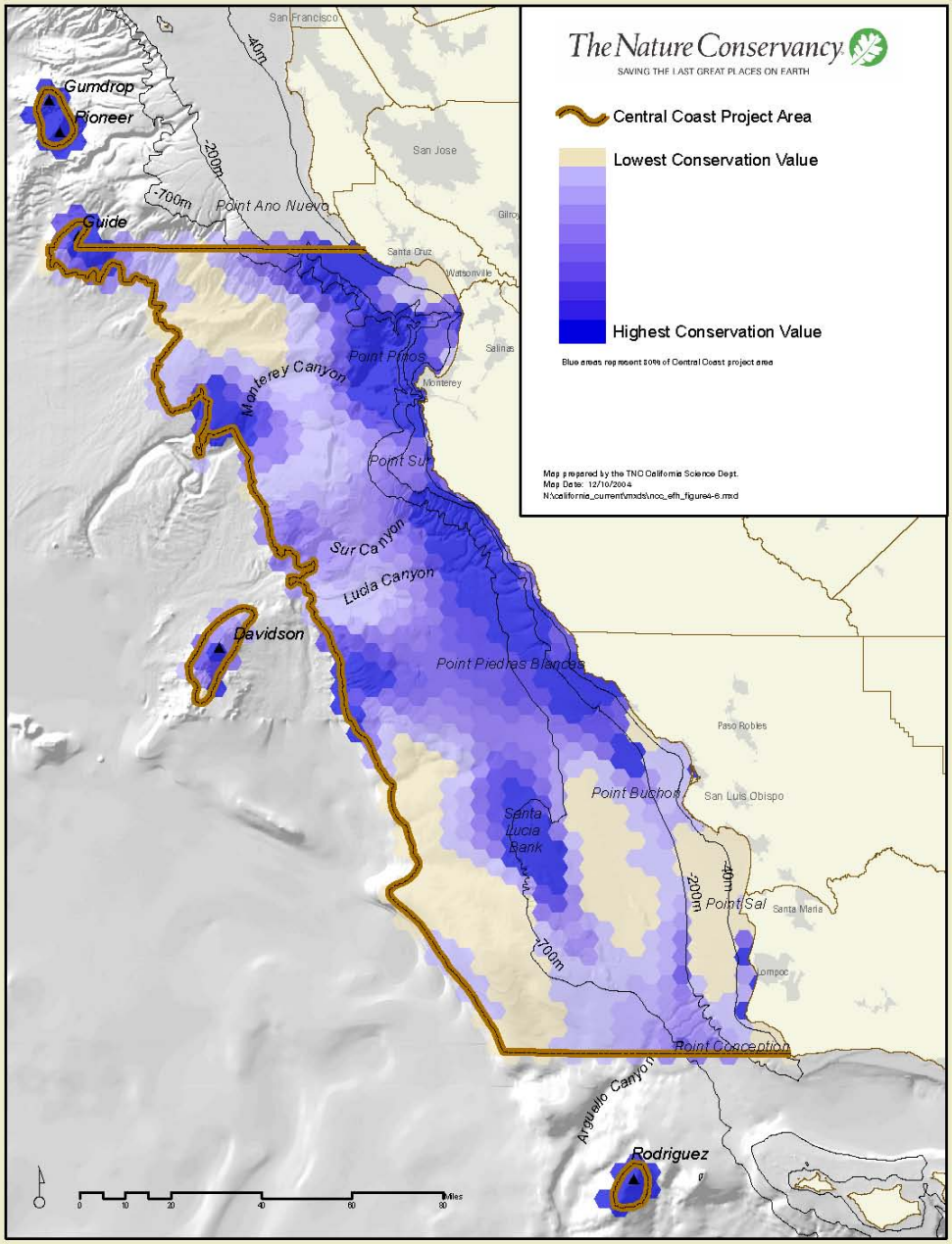


Figure 5. EFH Value - Number of Species / Lifestages

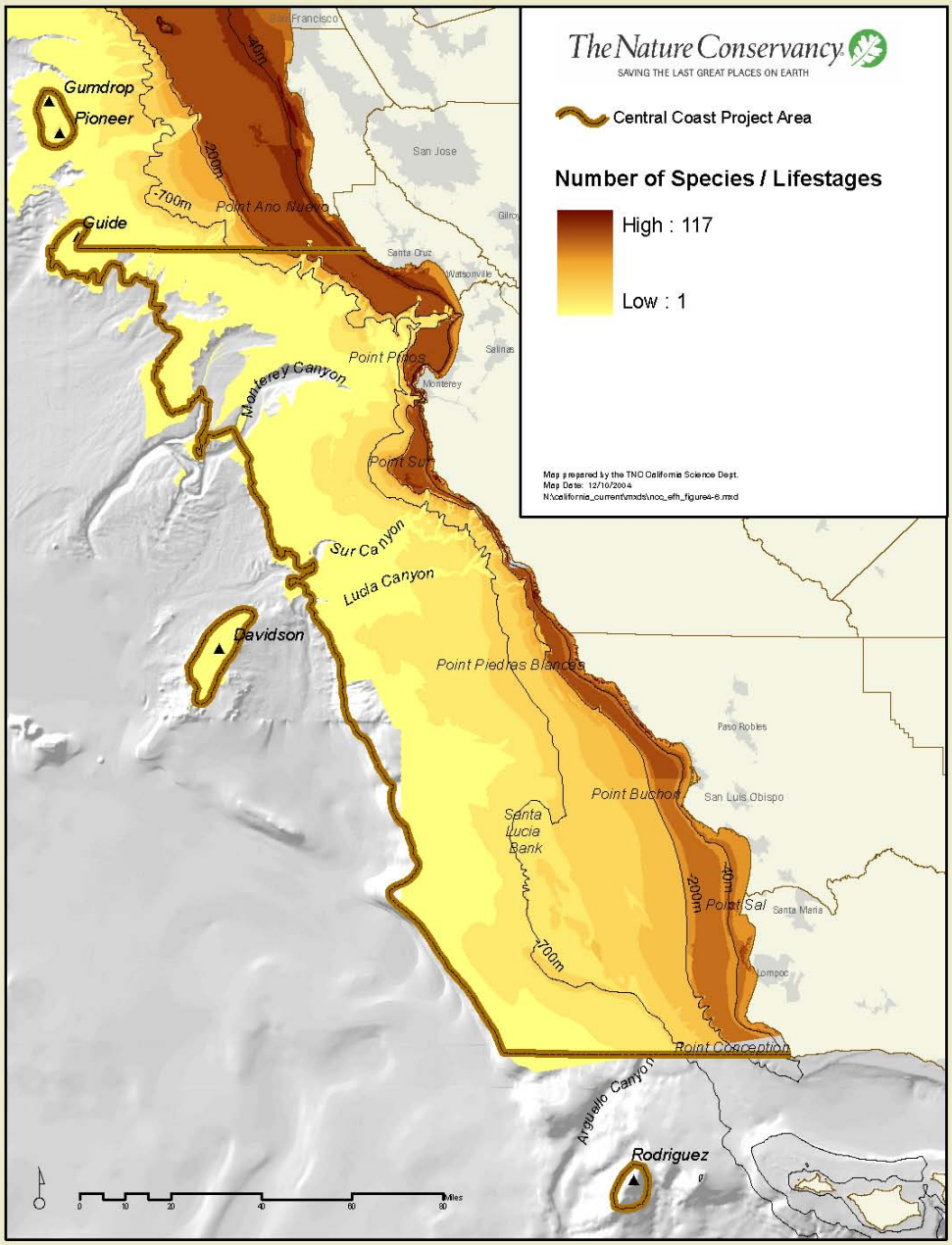
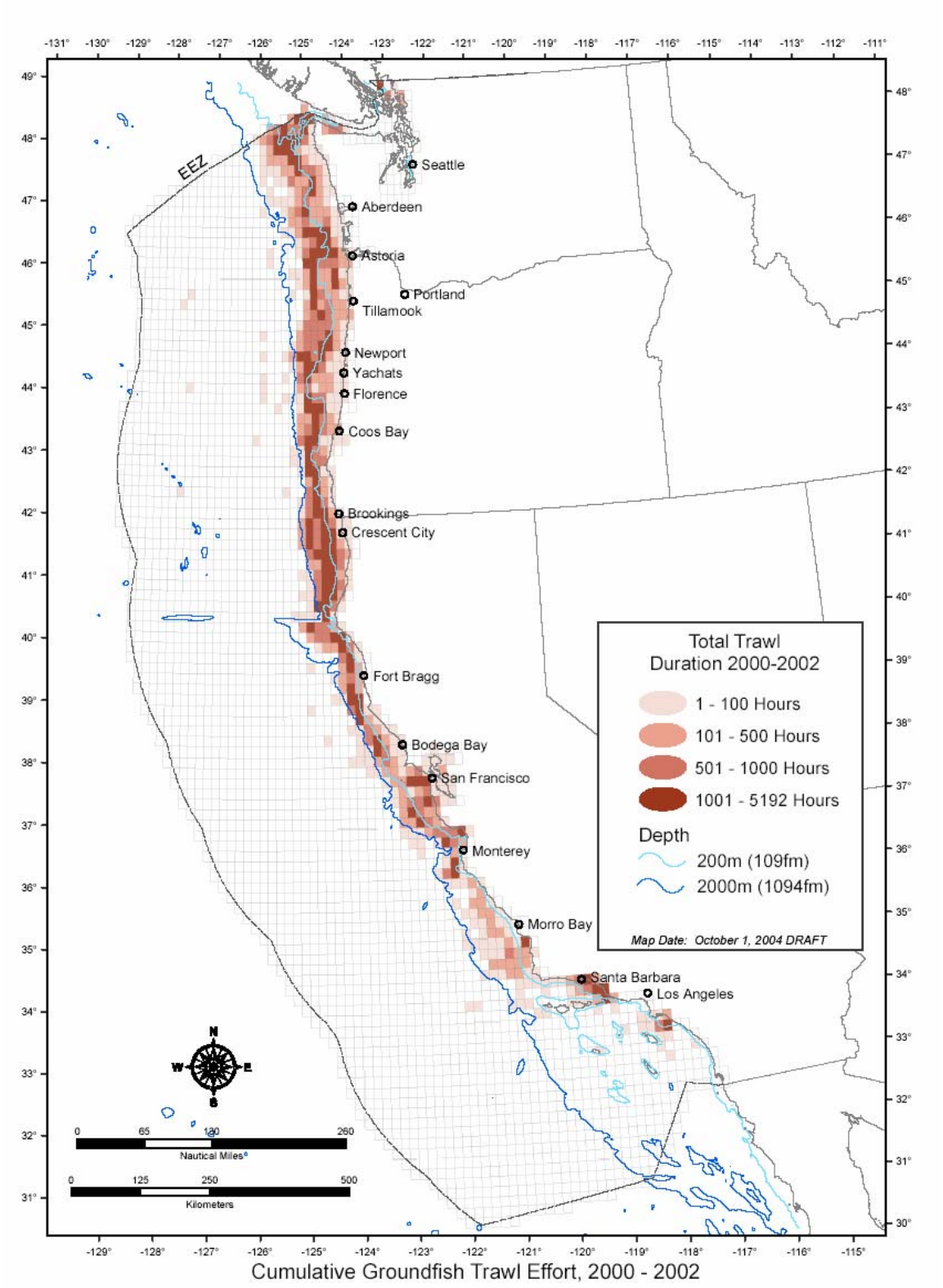
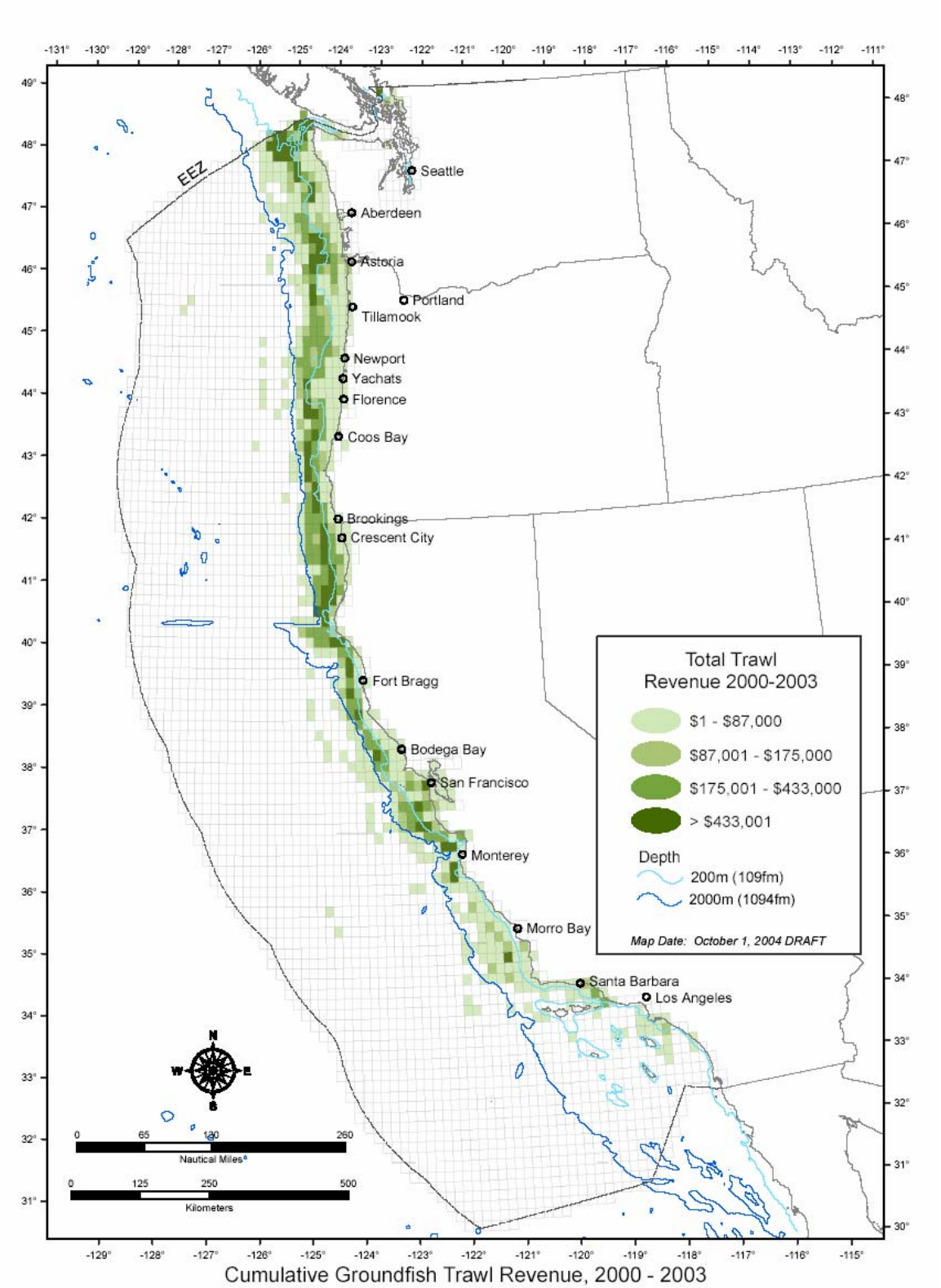


Figure 6. EFH Value - Sum of HSPs for Species / Lifestages



Cumulative Groundfish Trawl Effort, 2000 - 2002



Cumulative Groundfish Trawl Revenue, 2000 - 2003

Associated with the conservation and management objectives is the objective of providing economic mitigation to those entities impacted by the establishment of no-trawl zones.

> Bearing in mind that the buyout that we are proposing would, in and of itself, greatly reduce economic impacts arising from no-trawl zones in the project area, both TNC and Environmental Defense are committed to soften the impact of shifts and consolidations in the industry that may result from the implementation of our project. We will encourage companies and fisherman who may be the beneficiaries of the private buyback to give due financial consideration to employees who may be terminated; and likewise, we will do the same and consider some type of severance and/or training programs to assist in their transition to another job or career. Vessel crews, processing employees, skippers and other industry employees will be considered for assistance.

Negotiations Process

The final proposal will depend on negotiations with the industry and with the Council—(Negotiations with the industry have been initiated and will continue during the public comment period for this EIS.) For example, TNC&EDF, among other things, recognize in their proposal that participants in the buyback may not want to completely stop fishing and to have the remaining open areas protected:

> Fishermen who wish to remain in the industry are concerned that their "rights to trawl in their fishing grounds through the establishment of designated bottom trawl zones between Point Conception and Davenport are protected. These areas should comprise a yet to be determined percentage of the project area and be located in areas that can sustain their businesses financially.
>
> Fishermen want flexibility in the private acquisition process by giving consideration for allowing fishers to retain their vessels for future participation in NON-bottom trawl related fisheries, especially where they already own permits for different fisheries.

In highlighting the advantages of their proposal, TNC& EDF also highlight the various roles the Council will undertake: While this alternative was placed in the context of impacts mitigation, it also addresses other core components of the EFH-EIS process:

> Designation and Protection of Essential Fish Habitat: Identification of a large part of the shelf and slope as no-trawl zones would provide protection for EFH for several life stages of multiple species. Identification of these no-trawl areas would be accomplished in conjunction with the *Council* and would be based on Habitat Suitability models for groundfish and other data compiled during the EIS, fisher knowledge, and other sources of information that TNC has compiled for our ecoregional planning.

> Identification of Habitat Areas of Particular Concern (HAPCs): TNC has compiled data on representative benthic habitats, seamounts, structure-forming invertebrates, canyon heads, estuaries, kelp beds, and many other components of biodiversity and we will work with the *Council* and fishers to identify HAPCs as core components of the no-trawl zones.
>
> Minimization of Economic Impacts: TNC/Environmental Defense will use private funds to purchase permits and vessels, and will work with the *Council* to identify trawlable zones that would promote economic sustainability for the remainder of the fleet and the processors who buy from them.
>
> Reduced Conflict: The proposed buyout of willing sellers will be contingent upon a set of no-trawl zones, agreed upon through a participatory and deliberative process, potentially reducing conflict over measures to reduce the impacts of trawling in the project area at the *Council* level.

With respect to scientific research and management benefits, the TNC&EDF proposal lists the following:

> Adaptive Management: The identification of trawlable and no-trawl zones in a replicated and scientific manner and the implementation of scientific studies and monitoring will provide much-needed data for adaptive management of the groundfish fishery.

In terms of the overall negotiations process, TNC&EDF state:

> The Council approves the trawl and no-trawl zones contingent upon TNC/EDF successfully negotiating an option to purchase or contract at least 50% of the eligible permits in the project area and the TNC/EDF having a proven line of credit available to close those transactions. The contracts would be required to be consummated before or soon after the no-trawl zones went into effect.

In their discussion of what to do with the catch histories of the purchased permits, TNC&EDF the document requests and states that:

"We request that NOAA Fisheries use the best available fishing effort data from logbooks or other sources and overlay the highest 20% and 30% of fishing effort onto the project area and onto our maps of high conservation and high EFH value areas. Areas of high past fishing effort that do not overlap with areas of high conservation and EFH value can become the presumptive open areas until discussions with stakeholders aimed at identifying optimal open areas are pinpointed and negotiations concluded. "

"Under either or both scenarios, TNC pledges to work closely with PFMC, NOAA Fisheries, and the trawl fleet to explore the disposition possibilities of these fishing privileges. Our current thinking would be to bank 50% of this fish and sell, lease, or

otherwise transfer approximately 50% to either the residual trawl fleet on non-trawling groundfish fishers."

In a nutshell, the negotiation process will be one where TNC&EDF, the industry, and the Council will spatially try to maximize within the project area the amount of blue, brown, green, and red areas in the maps shown above along with amount of economic mitigation TNC&EDF is willing to provide and the industry is willing to accept; and the responsibilities, goals and objectives the Council and NOAA have under the Magnuson Act and under the Pacific Groundfish FMP. Invariably, there will be conflicts among competing objectives and choices will have to be made about the inclusion or exclusion of particular areas.

Summary of the Major Features of the Alternative

For discussion purposes, the following summary was developed by the drafters of this EIS --items in italics indicate areas potentially subject to negotiation or clarification.

> The project area in terms of federal action consist of two components: The marine water area and the seamount areas. The first component consists of the marine waters that are within the EEZ out to the 3000 meter depth contour that are due west of the central California coast from Point Conception to Davenport California. The second component consists of the following seamount areas that lie outside of the marine water area: Gumdrop, Guide Pioneer, Davidson, and Rodriquez.
>
> The project area is to be divided up into trawl and no-trawl zones as defined by the TNC/EDF's definition of areas of "high conservation and ecological value" and by negotiations with the industry about locations of fishing grounds that would remain open for bottom trawling.
>
> To reduce potential bottom trawl impacts on the habitat and to provide socio-economic mitigation from the establishment of the no-trawl areas, TNC/EDF proposes to purchase at least 13-15 of the 23 permits/vessel involved in the area (*federal permits only or federal permits and vessels*) whereby the vessels will be (*scrapped, lose their fishing privileges through loss of U.S. Coast Guard Documentation, lose their federal groundfish privileges but not other federal and state privileges, or potentially allowed to be sold into groundfish or other fisheries*) and the permits and associated catch histories retained by TNC/EDF. The associated equipment (*destroyed or would be allowed to be used in other fisheries*).
>
> The eligible vessel and permits would be drawn from a pool of 23 federally permitted vessels identified by TNC as those that "regularly fish" in the area and are associated with providing fish to processors in Avila (Old Port Seafood), Watsonville (Del Mar), Moss Landing (Del Mar, Bay Fresh, Soloman Live Fish),

> Monterey (Monterey Seafoods, Royale Seafoods) and Half Moon Bay (Three Captains). (Although TNC has suggested that they may buyout a few processors, for purposes of this analysis, we will assume that no processors will be purchased but the analysis will discuss in general terms any benefits that may arise from such purchases.)
>
> The "trawl zones" will be fished by (*the remaining 8-10 remaining vessels identified by TNC as those that "regularly fish" in the project area or by any trawler with a valid federal groundfish permit.)*
>
> The groundfish expected to be harvested by the buyback vessels is expected to be (*100% harvested by residual trawlers, 50% harvested by residual trawlers and 50% banked for resource and habitat protection, or 25% harvested by residual trawlers, 25% harvested by non-trawlers, and 50% banked for conservation and habitat benefit purposes, or 100% banked. Residual trawlers are those associated with the project area or all federally permitted trawlers*.)

It should be noted that according to the California Department of Fish and Game (http://www.dfg.ca.gov/mrd/mlpa/response/halibut.pdf):

> …bottom trawling is prohibited in state waters (0-3 nautical miles) except in the designated "California Halibut Designated Trawl Grounds" which encompass the area between Point Arguello and Point Mugu in waters greater than one nautical mile from shore. Trawls used in this area must have a minimum mesh size of 7.5 inches and trawling is prohibited from March 15 to June 15 to protect spawning adults.

Point Arguello is approximately 10-15 miles northwest of Point Conception the southernmost point of the project area. Therefore, state waters in the project area are already essentially closed to bottom trawling.

III. Related Background Information

Elsewhere in this document, reader will find information on the species and habitat associated with the project area. The information below provides information related to landing trends by species, revenues, and information from the 2003 Pacific Groundfish Trawl Buyback Program.

Trends in Trawl Landings

To develop trends in trawl landings and revenues, data was taken from the PFMC Groundfish Management Team Reports located on PSMFC PacFIN website http://www.psmfc.org/pacfin/pfmc.html. These reports summarize fish ticket data on annual basis by Port Group. Use was made of the following reports for the years 1981-2004: 010C PFMC Port Group Report: Groundfish Landed-catch (Metric tons) for All

Gears; 010Ctwl PFMC Port Group Report: Groundfish Landed-catch (Metric tons) for All Trawl Gear (except Shrimp Trawls); 020W PFMC Port Group Report: Estimated Ex-vessel Revenue ($1000) of Groundfish Landed-catch for All Areas for All Gears; and 020Wtwl PFMC Port Group Report: Groundfish Est. Ex-vess. Rev. ($1000) Landed-catch for All Trawl Gear (except Shrimp Trawls). The December 14, 2004 update of these tables was used. At this time the PacFIN Data Completeness Report indicated that the reported catch for California and Washington was estimated to be 90 percent complete through the month of October and for Oregon through the month of November.

These reports show landings coastwide and by port group. The port groups that are most closely aligned with the Project Area are the following:

> San Francisco Port Group—includes the ports of San Francisco, Sausalito, Oakland, Princeton/Half Moon Bay, Alameda, Berkeley and other San Francisco Bay and San Mateo County ports.
>
> Monterey Port Group—includes the ports of Moss Landing, Santa Cruz, Big Creek, Mill Creek, and other Santa Cruz and Monterey County Ports.
>
> Morro Bay Port Groups—includes the ports of Morro Bay, Avila, and other ports in San Louis Obispo County.

Based on the species composition, it is assumed that all of the landings associated with these Port Groups was done by bottom trawlers. Because, trawling is banned in state waters except for California halibut, it is assumed that all of these landings were taken from activities in the EEZ.

During 2004, trawlers landed about 2200 tons of groundfish worth about $2.7 million ex-vessel. These landings were comprised of flatfish (1420 tons), rockfish (506 tons), and roundfish (227 tons). Dover Sole, Petrale Sole, English Sole, and Rex Sole were the major species of flatfish landed. Longspine Thornyhead, Shortspine Thornyhead, Bank, Blackgill, Chilipepper, Splitnose, and Rosefish were the major rockfish species landed. Sablefish and lingcod were the major roundfish species landed.

Trawl landings in the Project Ports of the following species in 2004 were 20% or greater of the total coastwide trawl landings of the same species: Pacific sandabs (44%), Rock sole (46%), Sand Sole (13%), Starry Flounder (23%), Longspine Thornyhead (44%), Shortspine Thornyhead (23%), Aurora Rockfish (43%), Bank Rockfish (56%), Blackgill Rockfish (79%), Bocaccio Rockfish (56%), Chilipepper Rockfish (35%), Splitnose Rockfish (40%) and Rosefish (58%). xcept for sablefish (4%) and lingcod (5%), Project Port group trawl landings of these species as a percentage of total coastwide landings by all gear groups (trawl and non-trawl) are slightly lower than percentages reported above.

The historical trends of flatfish landings within the Project Area show that recent landings of flatfish are less than half of the amount of landings made prior to major declines associated with management measures designed to protect overfished species. Rockfish landings are about 10% to 15% below those that occurred prior to 2000. Total groundfish landings in the Project Area are about 20 to 30% of those that occurred prior to 2000. Note that coastwide landings of groundfish include Pacific whiting (shore and at-sea) - a fishery that did not get fully established in until the early 1990's. Pacific whiting is not landed in significant quantities in the Project Area.

Trends in Groundfish Trawl Landings (Metric Tons) By Project Port Group and Coastwide

		San Franciso	Monterey	Morrow Bay	Project	Coastwide	% Coastwide
				Flatfish			
1981	F	2343	902	338	3583	25659	14%
1985	F	1905	1088	3172	6165	30253	20%
1990	F	1213	436	1819	3468	27219	13%
1995	F	1278	1196	1313	3787	17999	21%
2000	F	1187	619	272	2078	16211	13%
2001	F	1032	578	215	1825	13835	13%
2002	F	711	569	318	1598	13022	12%
2003	F	661	806	430	1897	14142	13%
2004	F	655	388	378	1421	12646	11%
				Rockfish			
1981	R	2255	1782	1310	5347	53998	9.90%
1985	R	1424	1330	1189	3943	30127	13.09%
1990	R	2217	227	2382	4826	35273	13.68%
1995	R	960	1390	1096	3446	25403	13.57%
2000	R	341	327	195	863	10636	8.11%
2001	R	214	259	123	596	6744	8.84%
2002	R	214	256	410	880	5193	16.95%
2003	R	143	266	298	707	3444	20.53%
2004	R	216	104	185	505	2768	18.24%
				Roundfish			
1981	Ro	804	412	190	1406	10348	13.59%
1985	Ro	555	239	418	1212	14357	8.44%
1990	Ro	276	34	404	714	20935	3.41%
1995	Ro	159	154	233	546	179993	0.30%
2000	Ro	67	62	36	165	209438	0.08%
2001	Ro	54	64	29	147	176805	0.08%
2002	Ro	65	76	49	190	1580	12.03%
2003	Ro	76	87	78	241	2323	10.37%
2004	Ro	105	55	67	227	26694	0.85%
				All Groundfish			
1981	G	5469	3153	1842	10464	90930	12%
1985	G	3918	2672	4781	11371	75242	15%
1990	G	3728	716	4618	9062	84026	11%
1995	G	2421	2875	2644	7940	224957	4%
2000	G	1638	1049	506	3193	238424	1%

2001	G	1328	940	370	2638	199254	1%
2002	G	1010	928	785	2723	155751	2%
2003	G	898	1178	813	2889	164478	2%
2004	G	987	589	631	2207	223054	1%

Landing trends of overfished species in the Project Area, suggest that only bocaccio, lingcod, and cowcod were significantly fished in the past. (Estimates of landings include landings labeled “nominal” in the PacFIN categories.)

Total Trawl Landings (metric tons) of Overfished Species in Project Area

	Project Trawl	Coast Trawl	Coast All Gears	% Coast Trawl	% Coast All Gears
		Total Bocaccio Landings			
1981	1715	4662	5377	37%	32%
1985	551	1839	2793	30%	20%
1990	644	1568	2473	41%	26%
1995	209	510	890	41%	23%
2001	9	23	32	39%	28%
2002	12	25	28	47%	41%
2003	0	9	9	1%	1%
2004	6	11	15	56%	40%
		Total Canary Landings			
1981	33	2971	3208	1%	1%
1985	15	1768	2439	1%	1%
1990	13	2278	2596	1%	1%
1995	25	697	896	4%	3%
2001	1	28	46	4%	2%
2002	0	48	52	0%	0%
2003	0	9	10	2%	2%
2004	0	14	16	1%	1%
		Total Cowcod Landings			
1981	6	15	83	39%	7%
1985	3	8	145	39%	2%
1990	8	9	34	82%	22%
1995	33	38	66	86%	49%
2001	0	1	1	11%	11%
2002	0	0	0	0%	0%
2003	0	0	0	0%	0%
2004	0	0	0		
		Total Darkblotched Landings			
1981	3	538	561	1%	1%
1985	79	1754	1760	5%	4%
1990	85	1542	1650	6%	5%
1995	25	725	732	3%	3%
2001	5	126	128	4%	4%
2002	5	108	109	5%	5%

2003	2	80	80	3%	2%
2004	5	204	204		
		Total Lingcod Landings			
1981	619	2841	3309	22%	19%
1985	90	2869	3878	3%	2%
1990	126	2016	2907	6%	4%
1995	92	1075	1469	9%	6%
2001	6	60	156	9%	4%
2002	6	106	206	6%	3%
2003	8	76	166	10%	5%
2004	9	74	171	12%	5%
		Total Pacific Ocean Perch Landings			
1981	1	1335	1415	0%	0%
1985	0	1492	1492	0%	0%
1990	0	1032	1039	0%	0%
1995	1	808	810	0%	0%
2001	0	258	258	0%	0%
2002	0	150	150	0%	0%
2003	0	132	132	0%	0%
2004	0	116	116	0%	0%
		Total Widow Rockfish Landings			
1981	881	26915	26985	3%	3%
1985	165	8516	9109	2%	2%
1990	299	9260	9770	3%	3%
1995	417	6627	6730	6%	6%
2001	22	1829	1845	1%	1%
2002	3	350	350	1%	1%
2003	3	38	40	8%	8%
2004	0	68	69	1%	1%
		Total Yelloweye Landings			
1981	2	35	370	5%	1%
1985	1	110	111	1%	1%
1990	2	185	159	1%	1%
1995	1	138	206	1%	1%
2001	0	2	12	0%	0%
2002	0	1	4	10%	3%
2003	0	1	1	0%	0%
2004	0	0	2	0%	0%

Projected landings of overfished groundfish species and other groundfish species by limited entry trawl vessels into Project Area Ports are reported below. They are taken from the Pacific Council EIS on 2005-2006 Specifications Appendix A.

TABLE 8-16f. Projected 2005 groundfish landings by species and port for the **limited entry trawl** fleet under the **Council Preferred Alternative** (mt). (Page 1 of 1)

Port (PCID)	Lingcod	Whiting	Sablefish	POP	Widow	Canary	Chili-pepper	Yellow-tail	Short-spine	Long-spine	Slope Rockfish	Other Rockfish	Dover	Petrale	Arrow-tooth	Other Flatfish	Port Total
Blaine	2.1	0.0	27.0	0.1	0.0	0.4	0.0	9.8	3.6	0.3	7.4	3.1	64.8	98.8	165.3	80.0	462.6
Neah Bay	2.6	0.0	36.3	0.0	0.0	0.5	0.0	7.0	1.3	0.0	0.0	1.5	26.2	54.5	22.8	364.2	516.9
Westport	1.0	16,536.7	27.1	0.2	0.0	0.2	0.0	6.1	3.6	0.7	1.4	0.1	80.4	48.9	38.3	58.0	16,804.8
Ilwaco	0.0	2,440.8	2.4	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.7	0.0	1.1	0.0	0.2	0.0	2,445.5
Astoria	11.6	25,084.7	444.7	25.3	0.0	1.5	0.0	44.5	98.1	111.8	48.8	4.5	1,597.6	717.5	406.9	934.8	29,532.3
Garibaldi	0.7	0.0	3.5	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	15.2	47.4	1.9	68.6	137.5
Newport	6.1	67,833.2	410.8	15.3	0.0	0.4	0.7	8.7	90.1	67.1	46.2	8.6	731.1	387.9	267.8	260.1	70,134.0
Florence	0.5	0.0	1.9	0.0	0.0	0.1	0.0	0.1	0.2	0.1	0.0	0.1	11.5	6.2	0.1	77.1	97.8
Charleston	6.0	9,010.2	329.3	23.3	0.0	0.6	0.0	6.3	80.0	110.1	28.1	3.9	1,059.1	611.0	69.3	671.4	12,008.7
Brookings	1.4	7,453.8	109.0	4.7	0.0	0.1	0.0	0.0	25.7	37.6	3.6	0.2	255.9	47.0	2.1	65.8	8,006.7
Crescent City	1.4	0.0	70.1	3.9	0.0	0.1	0.0	0.1	14.0	30.5	2.1	0.5	178.3	32.6	4.0	196.1	533.7
Eureka Area	3.3	2,300.4	173.9	9.9	0.0	0.2	0.0	4.3	51.0	79.8	9.7	2.9	510.3	139.7	26.4	246.1	3,557.8
Fort Bragg	0.7	0.0	194.1	0.0	0.0	0.0	6.7	0.0	77.4	103.2	44.5	5.2	635.1	27.1	0.5	111.0	1,205.6
Bodega Bay	0.5	5,610.8	33.7	0.6	0.0	0.0	0.7	0.0	11.0	17.8	26.1	2.7	66.9	13.4	0.7	39.2	5,824.2
San Francisco	5.3	0.0	103.3	0.0	0.0	0.5	6.2	8.1	32.9	31.1	97.4	7.9	356.9	138.2	117.7	440.1	1,345.5
Princeton	4.0	0.0	9.4	0.0	0.0	0.2	2.8	0.0	1.1	1.2	1.0	1.0	34.8	51.2	0.0	308.5	415.3
Santa Cruz	0.4	0.0	19.3	1.3	0.0	0.0	0.3	0.9	2.3	2.1	0.1	0.1	35.2	13.5	1.6	70.8	148.1
Moss Landing	1.7	0.0	54.1	0.3	0.0	0.1	3.0	0.1	26.8	33.3	51.4	4.1	256.4	38.6	6.7	169.2	645.7
Monterey	1.2	468.1	39.3	0.3	0.0	0.0	2.6	0.0	19.9	32.7	41.1	2.1	135.7	9.7	1.2	106.5	860.3
Morro Bay	0.2	0.0	4.3	0.0	0.0	0.0	0.2	0.0	3.1	4.5	6.2	1.1	29.0	16.4	0.0	19.1	84.1
Avila	0.2	0.0	48.6	0.0	0.0	0.0	0.2	0.0	34.1	48.7	121.3	4.2	208.5	18.8	0.1	23.5	508.4
Species Total	50.8	136,740.7	2,142.2	85.4	0.0	5.1	23.4	96.1	576.4	712.5	537.1	53.6	6,290.1	2,518.5	1,133.6	4,310.1	155,275.6

The trends in overall ex-vessel groundfish trawl revenues follow the same trends as total groundfish landings. Ex-vessel revenues in recent years are about half they were prior to 2000. For perspective, Project area groundfish trawl revenues are about half of the total groundfish revenues associated with all gears in the Project Area.

Trends in Ex-vessel Revenues ($1000) by Project Port Group and Coastwide

	San Francisco	Monterey	Morrow Bay	Project Area	Coastwide	% Coastwide
			Groundfish Trawl Revenues			
1981	2.7	1.4	0.9	5.0	40.7	12%
1985	2.5	1.5	2.6	6.6	41.1	16%
1990	2.8	0.6	3.4	6.8	48.6	14%
1995	2.5	3.2	3.1	8.8	74.4	12%
2000	1.8	1.2	0.6	3.6	55.7	6%
2001	1.5	1.1	0.5	3.1	43.1	7%
2002	1.2	1.1	1.0	3.3	38.9	8%
2003	1.1	1.2	1.0	3.3	43.4	8%
2004	1.2	0.7	0.8	2.7	38.2	7%
			Total Groundfish Revenues-All Gears			
1981	3.1	2.0	1.5	6.6	49.4	13%
1985	4.5	2.5	3.1	10.1	55.8	18%
1990	4.8	2.7	4.2	11.7	63.9	18%
1995	3.6	5.2	4.8	13.6	96.8	14%
2000	2.7	2.7	1.7	7.1	75.3	9%
2001	2.1	2.2	1.6	5.9	59.8	10%
2002	1.6	2.0	2.0	5.6	52.4	11%
2003	1.5	2.3	1.9	5.7	60.3	9%
2004	1.6	1.5	1.7	4.8	54.1	9%

If Pacific whiting landings and revenues are taken out of the totals, project area trawlers, in recent years, account for 10-12 percent of coastwide trawl landings and 10-13 percent of coastwide trawl revenues, percentages lower than those associated in prior years.

Project Area Trawlers Share of Non-Whiting Groundfish Trawl Landings and Revenues

	Coastwide Groundfish MT	% Coastwide	Coastwide Revenues 1000$	% Coastwide
1981	90094	12%	40.6	12%
1985	71352	16%	40.5	16%
1990	71268	13%	46.8	15%
1995	50329	16%	56.4	16%
2000	31970	10%	34.7	10%
2001	25683	10%	29.1	11%
2002	25758	11%	25.3	13%
2003	23119	12%	26.1	13%
2004	20110	11%	21.8	12%

Related Port, Vessel, Processing, Buyback, and Recreational Information

Chapter 3 of this EIS provides information on the landings of other fish in the project areas ports. Project area ports are involved in more than trawling for groundfish. They tend to be involved in the open access groundfish fishery, pink shrimp fishery, and the California halibut fishery as indicated by the relevant rankings of ports reported in Chapter 3.

Presence of Project Area Ports in Top 15 Port Rankings by Gear/Species/Species Group
(Rankings in Terms of Revenue)

	San Francisco	Sausalito	Princeton/ Half Moon Bay	Monterey	Moss Landing	Morro Bay	Avila
Limited Entry Trawl	13		8				
Limited Entry Fixed	13				5		
Open Access	11			12	3	1	6
Dungeness Crab	10		15				
Highly Migratory	13				11	6	
Pink Shrimp				15		11	13
Ridgeback Prawns			13		9		10
Salmon	6		9		11		
California Halibut	1		3	14	12	15	11
Calif. Sheepshead						15	
Coastal Pelagics	7	10	11	8	3		
Spot Prawns	12			2	9	1	

Pink shrimp, spot prawns, and Ridgeback Prawns are taken by trawlers. The following table taken from (Pacific Council's 2005-2006 Specs document Appendix A) shows in more detail the types of fish landed in each of the Project Area ports by all gears.

TABLE 8-2b. Total Commercial Deliveries (including Tribal fisheries) of Council-Managed Species to West Coast Port Areas in 2002 (mt). (Page 2 of 2)

	California												
Species Group	Crescent City	Eureka	Fort Bragg	San Francisco	Monterey	Morro Bay	Santa Barbara	Los Angeles	San Diego	Unsp. CA	CA TOTAL	At Sea TOTAL	Grand TOTAL
Lingcod	22.6	14.5	13.8	10.2	9.5	8.4	1.4	0.3	0.3	0.0	80.9	0.1	205.2
Whiting (at sea)	0.0	0.0	0.0	3,016.2	0.0	0.0	0.0	0.0	0.0	0.0	3,016.2	70,952.7	84,494.3
Whiting (shoreside)	0.0	2,775.3	0.0	0.1	0.0	0.0	0.0	0.3	0.0	0.0	2,775.8	0.0	45,807.5
Flatfish	907.1	1,202.2	1,110.6	835.8	569.9	326.9	11.3	11.0	0.2	0.0	4,975.0	4.4	13,220.1
Sablefish	162.3	259.4	319.8	149.8	238.8	56.1	15.6	45.0	72.8	0.0	1,319.5	18.7	3,829.8
Rockfish	285.4	424.2	713.7	322.0	320.7	488.4	56.6	63.1	64.9	0.0	2,738.9	287.0	5,974.1
Other Groundfish	7.7	35.6	49.4	20.3	126.7	30.6	20.2	15.8	7.7	0.0	313.9	1.2	2,114.5
Total Groundfish	1,385.0	4,711.1	2,207.3	4,354.4	1,265.6	910.4	105.1	135.4	145.9	0.0	15,220.3	71,264.1	155,645.5
Pink Shrimp Trawl	1,869.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1,869.5	0.0	25,302.4
Spot Prawn Trawl	0.0	0.0	2.8	23.6	11.4	39.9	21.4	0.2	0.0	0.0	99.2	0.0	99.2
Spot Prawn Pot	0.0	0.2	0.0	0.1	26.1	4.6	14.9	18.8	14.3	0.1	79.0	0.0	79.0
Ridgeback Prawn Trawl	0.0	0.0	0.0	0.0	0.0	0.8	212.6	1.7	0.0	0.0	215.2	0.0	215.2
Pacific Halibut	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	421.6
California Halibut[a/]	0.1	3.5	0.0	157.1	32.6	6.9	86.5	21.1	1.4	0.0	309.1	0.0	309.1
Salmon	0.0	76.4	0.0	1,891.5	0.0	81.9	0.0	0.0	0.0	0.0	2,049.8	0.0	4,660.4
Sea Cucumber	0.0	0.0	0.2	0.4	0.0	0.5	350.8	67.9	5.9	0.1	425.7	0.0	425.7
California Sheephead	0.0	0.0	0.0	0.3	0.0	0.3	23.0	17.0	11.7	0.0	52.2	0.0	52.2
Gillnet Complex[b/]	0.0	0.0	0.0	0.0	6.8	10.5	148.8	170.5	15.2	0.0	352.0	0.0	352.5
Squid	0.0	0.0	3.9	866.2	25,089.6	356.5	18,441.4	28,185.6	1.0	0.0	72,944.2	10.4	72,957.7
Other CPS	0.0	0.1	0.0	189.2	16,313.1	102.0	5,811.1	44,866.9	95.8	0.0	67,378.2	5.8	106,754.3
HMS	136.3	1,121.5	21.2	72.8	420.1	290.3	293.6	2,589.5	638.5	0.0	5,583.8	0.0	12,908.5
Dungeness Crab	742.3	537.7	2,496.0	1,859.2	48.8	14.5	0.1	0.0	0.0	0.0	5,698.6	0.0	15,504.6
Other Crustaceans	36.0	6.3	0.8	377.1	0.5	54.1	506.7	153.2	164.4	4.4	1,303.5	0.0	1,464.9
Other Species	51.8	207.6	1,962.0	3,839.7	85.4	19.9	2,145.2	1,366.9	509.8	25.6	10,213.8	851.9	16,638.6
Total Council-Managed	4,221.0	6,664.4	6,894.4	13,631.5	43,299.9	1,893.0	28,161.2	77,594.8	1,603.8	30.2	183,794.1	72,132.2	413,791.4

a/ Excluding California halibut caught in Gillet Complex.
b/ Includes California halibut, white sea bass, sharks, and white croaker.

In terms of number of vessels fishing out of each Port in 2001 there were 33 limited entry trawlers fishing out of Project Area ports excluding the port of San Franciso; 18 limited entry fixed gear permitted vessels, 239 open access vessels that earned more than 5% of their revenues from groundfish, 360 open access vessels with less than 5% of the revenues from groundfish, 26 shrimp and prawn vessels some portion of which are trawlers.

TABLE 8-4. Number of vessels by vessel primary port and species group in 2001.[a/] (Page 3 of 4)

	Vessels with Limited Entry Trawl Permits						Vessels with Fixed Gear Limited Entry Permits (No Trawl Permit)						Open Access Vessels with More than 5% Revenue from Groundfish					Open Access Vessels with Less than 5% Revenue from Groundfish					Vessels Participating in Other Fisheries							
	Whiting	Sablefish	Nearshore spp	Shelf spp	Slope spp	Total	Sablefish	Nearshore spp	Shelf spp	Slope spp	Total	Sablefish	Nearshore spp	Shelf spp	Slope spp	Total	Sablefish	Nearshore spp	Shelf spp	Slope spp	Total	Total GF	Hal. (Pac. & CA)	Shrimp / Prawns	Crabs	Salmon	HMS	CPS	Other	Total
Fort Bragg	-	12	5	12	12	12	3	1	3	3	4	27	36	34	6	57	4	5	3	1	8	81	3	3	26	49	19	1	56	130
Albion	-	-	-	-	-	-	-	-	-	-	-	2	6	5	-	7	-	1	1	-	2	9	-	-	2	2	1	-	12	17
Point Arena	-	-	-	-	-	-	-	-	-	-	-	-	4	3	1	4	-	3	2	1	4	8	-	-	5	3	1	-	11	19
Fort Bragg Total	0	12	5	12	12	12	3	1	3	3	4	29	46	42	7	68	4	9	6	2	14	98	3	3	33	54	21	1	79	166
Bodega Bay	-	-	-	-	-	-	2	2	2	1	2	1	21	23	7	26	1	1	11	1	11	39	14	-	44	125	28	1	24	171
Cloverdale	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	2	-	3	3	4	-	6	4	1	-	17	24
Yountville	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	1	1	-	-	-	1	2	1	-	10	2	-	-	9	15
Tomales Bay	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	1
Point Reyes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	6	8	1	-	-	10
Sausilito	-	-	-	-	-	-	-	-	-	-	-	1	-	1	1	1	-	4	5	-	5	6	7	-	4	21	6	1	39	53
Bodega Bay Total	-	-	-	-	-	-	2	2	2	1	2	2	22	25	8	28	2	8	18	1	20	50	33	-	70	161	36	2	89	274
Oakland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
Alameda	-	-	-	-	-	-	-	-	-	-	-	-	2	1	1	2	-	-	-	-	-	2	-	-	-	1	-	-	2	3
Berkeley	-	-	-	-	-	-	-	-	-	-	-	1	8	9	3	10	-	-	-	-	-	10	5	-	-	4	2	-	8	15
Richmond	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	2	-	-	1	-	1	3	3	1	-	5	-	-	1	10
San Francisco	-	6	6	6	6	6	6	6	8	7	9	9	22	21	12	27	1	5	7	1	9	51	33	3	29	59	17	2	86	155
Princeton	1	6	8	8	7	8	3	2	2	3	3	8	39	36	8	44	1	6	6	3	11	66	34	2	56	74	30	10	43	135
San Francisco Total	1	12	14	14	13	14	9	8	10	10	12	18	71	68	25	85	2	11	14	4	21	132	75	6	85	143	49	12	141	319
Gilroy	-	-	-	-	-	-	-	-	-	-	-	-	10	8	2	10	-	-	-	-	-	10	-	-	1	-	1	-	8	10
Santa Cruz	-	2	2	2	2	2	-	-	-	-	-	9	11	11	10	18	1	5	4	1	6	26	18	-	7	31	19	3	19	46
Moss Landing	-	8	6	8	8	8	11	2	6	11	11	19	24	23	13	38	1	2	2	1	6	63	27	2	6	71	42	7	38	132
Monterey	-	2	2	2	2	2	-	1	-	1	1	1	25	23	6	26	2	3	1	3	6	35	23	5	1	50	10	5	42	81
Monterey Total	0	12	10	12	12	12	11	3	6	12	12	29	70	65	31	92	4	10	7	5	18	134	68	7	15	152	72	15	107	269
San Simeon	-	-	-	-	-	-	-	-	-	-	-	-	6	6	-	6	-	-	-	-	-	6	-	-	-	-	-	-	3	6
Morro Bay	-	2	2	2	2	2	-	1	2	-	2	2	56	49	10	57	2	16	13	7	20	81	26	9	19	36	68	6	55	122
Avila	1	5	2	5	5	5	-	-	1	1	1	-	50	47	2	50	-	10	8	1	10	66	32	5	17	9	31	3	46	78
Morro Bay Total	1	7	4	7	7	7	0	1	3	1	3	2	112	102	12	113	2	26	21	8	30	153	58	14	36	45	99	9	104	206

Buyback:

In 2003, Pacific Groundfish Trawl Buyback Program was implemented. The results of the Buyback Program were described in "The Aftereffects of the Pacific Groundfish Limited Entry Trawl Buyback Program A Preliminary Analysis NMFS NWR (April 09, 2004 Draft)" analysis Based on information associated with this analysis which included the port of Bodega Bay, 11 of the 40 trawl vessels associated with the project area were retired from fishing. The 11 vessels earned in 2002 about $1.7 million in ex-vessel revenues; about eighty percent from groundfish fishing. Collectively they were paid about $4.5 million in exchange for permanently losing Coast Guard documentation privileges to fish and surrendering 11 federal groundfish permits, 3 California state shrimp permits, one California crab permit, one Oregon shrimp permit, and t2 federal high-seas permits. Based on 2002 landings data, the remaining 29 vessels earned collectively about $4.8 million in ex-vessel revenues about 60 percent of which was from groundfish fishing.

Effects of The 2003 Buyback on Project Area

	2002 Active Trawlers	Buyback Trawlers	Remaining Trawlers
Avila	7	4	3
Bodega Bay	2	1	1
Santa Cruz	2	0	2
Monterey	4	0	4
Moss Landing	8	4	4
Princeton/Half Moon Bay	11	1	10
Morro Bay	2	0	2
San Francisco	4	1	3
Total	40	11	29
Total Buyback Payments		$4,531,000	
2002 Groundfish Revenues	$4,404,000	$1,442,000	$2,962,000
2002 All Species Revenues	$6,630,000	$1,796,000	$4,834,000

Processing:

The number of buyers and processors who purchased raw fishery products in 2001 numbered 70 in Monterey and 35 in Morrow Bay. Council estimates below do not break out other Project Area Ports presumably because of confidentiality. Note that there were only 4 processors in Monterey, and 4 processors in Morro Bay that purchased amounts greater than $300,000.

TABLE 8-7. Number of buyers/processors by purchase value of raw product (exvessel value) in 2001.[a/] (Page 1 of 1)

	Level of Purchases in Exvessel Value						
	<$5,000	$5,000-$20,000	$20,000-$100,000	$100,000-$300,000	$300,000-$1,000,000	>$1,000,000	Total
Puget Sound	51	40	52	18	19	16	196
North Washington Coast	35	14	15	6	4	4	78
Central WA Coast	9	6	6	1	2	5	29
South WA Coast	31	25	15	4	3	3	81
Astoria - Tillamook	25	8	10	1	7	4	55
Newport	34	17	14	1	3	4	73
Coos Bay	36	26	5	5	0	0	74
Brookings	4	3	6	1	0	0	18
Crescent City	11	11	1	1	3	4	31
Eureka	17	9	3	3	0	0	32
Fort Bragg	16	6	4	0	0	0	30
Bodega Bay - San Francisco	104	39	28	13	13	3	200
Monterey	40	12	8	6	2	2	70
Morro Bay	16	9	4	2	2	2	35
Santa Barbara	32	19	21	15	8	4	99
Los Angeles	37	17	23	16	10	10	113
San Diego	13	10	11	9	0	0	47
At-Sea Only	0	-	-	0	0	0	13
Total	492	254	223	100	76	60	1,283

NOTE: "*" = Values omitted to preserve confidentiality.
a/ Actual period is November 2000 through October 2001.

The Pacific Council has also produced estimates of income and employment associated with groundfish trawling in Project Area Ports. In the Ports of Monterey and Morro Bay, groundfish limited entry trawl fishing is associated with 8 to 10% of the fisheries income with employing 126 full time equivalent employees out a total of 1500 commercially related employees in these ports. Groundfish trawling contributed about $3.6 million in personal income to the ports of Monterey and Morro Bay compared to $46 million from all commercial fishing operations in these ports.

TABLE 8-8a. Income and employment from commercial fishing activities by port group in 2001.[a/] (Page 1 of 1)

	All Commercial Fishery						All Groundfish			
Port Group Area	Commercial Fishery-Related Income ($,000)	Fishery-Related Income as a share of Total Personal Income (Percent)	(Rank)	Commercial Fishery-Related Employment	Fishery-Related Employment as a share of Total Employment (Percent)	(Rank)	Income ($,000)	Employ.	Groundfish-Related Income as a share of Total Fishery Income (Percent)	(Rank)
Puget Sound	14,344	0.01%	17	531	0.03%	16	8,694	322	60.61%	1
North WA Coast	8,262	0.36%	9	357	1.14%	8	4,865	210	58.89%	2
Central WA Coast	29,858	2.03%	5	1,091	4.26%	6	7,442	272	24.93%	10
South WA Coast	21,053	4.78%	1	957	14.24%	1	1,557	71	7.39%	14
Astoria/Tillamook	46,402	3.29%	4	1,959	7.72%	4	24,122	1,019	51.98%	3
Newport	45,709	4.27%	2	1,968	10.76%	2	22,122	952	48.40%	5
Coos Bay	23,476	0.20%	11	948	0.44%	11	9,266	374	39.47%	7
Brookings	8,792	1.77%	6	400	5.76%	5	3,754	171	42.70%	6
Crescent City	19,111	3.90%	3	773	9.43%	3	6,246	253	32.68%	9
Eureka	14,729	0.50%	8	591	1.11%	9	7,501	301	50.93%	4
Fort Bragg	15,740	0.73%	7	650	1.82%	7	6,183	255	39.28%	8
Bodega Bay/ San Francisco	39,330	0.02%	15	1,205	0.04%	15	5,744	176	14.60%	13
Monterey	34,174	0.16%	12	1,146	0.39%	12	5,091	171	14.90%	12
Morro Bay	10,348	0.16%	13	374	0.36%	13	2,482	90	23.99%	11
Santa Barbara	98,377	0.26%	10	3,075	0.78%	10	1,396	44	1.42%	16
Los Angeles	149,075	0.04%	14	3,840	0.06%	14	1,148	30	0.77%	17
San Diego	13,431	0.01%	16	367	0.03%	17	625	17	4.65%	15
TOTAL	592,209	0.06%		20,230	0.15%		118,239	4,726	19.97%	

Note: Includes total income and employment impacts: wages and salaries paid to primary producers, processors and suppliers, and the additional income and employment generated when wages and salaries are spent (PFMC FEAM 9/02).

a/ Actual period is November 2000 through October 2001.

TABLE 8-8b. Income and employment from commercial fishing activities by port group in 2001.[a/] (Page 1 of 1)

	Groundfish Limited Entry Trawl				Other Groundfish Gear			
Port Group Area	Income ($,000)	Employ.	Limited Entry Groundfish Trawl-Related Income as a share of Fishery Income (Percent)	(Rank)	Income ($,000)	Employ.	Other Groundfish-Related Income as a share of Fishery Income (Percent)	(Rank)
Puget Sound	6,558	243	45.72%	2	2,136	79	14.89%	3
North WA Coast	1,318	57	15.96%	10	3,547	153	42.93%	1
Central WA Coast	6,558	240	21.96%	9	885	32	2.96%	14
South WA Coast	1,377	63	6.54%	14	180	8	0.85%	16
Astoria/Tillamook	22,338	943	48.14%	1	1,784	75	3.85%	13
Newport	19,991	861	43.74%	3	2,132	92	4.66%	10
Coos Bay	7,718	312	32.88%	5	1,548	63	6.59%	8
Brookings	1,985	90	22.58%	8	1,769	80	20.12%	2
Crescent City	5,019	203	26.26%	7	1,227	50	6.42%	9
Eureka	6,437	258	43.70%	4	1,064	43	7.23%	7
Fort Bragg	4,503	186	28.61%	6	1,680	69	10.68%	5
Bodega Bay/San Francisco	4,176	128	10.62%	11	1,569	48	3.99%	12
Monterey	2,579	86	7.55%	13	2,512	84	7.35%	6
Morro Bay	1,095	40	10.58%	12	1,388	50	13.41%	4
Santa Barbara	9	0	0.01%	16	1,387	43	1.41%	15
Los Angeles	1	0	0.00%	17	1,147	30	0.77%	17
San Diego	4	0	0.03%	15	621	17	4.62%	11
TOTAL	91,664	3,709	15.48%		26,575	1,017	4.49%	

Note: Includes total income and employment impacts: wages and salaries paid to primary producers, processors and suppliers, and the additional income and employment generated when wages and salaries are spent (PFMC FEAM 9/02).

a/ Actual period is November 2000 through October 2001.

Recreational Fishing. Recreational data for Central California as reported in the California Marine Life Report (Table III-7) that charter vessels on average during the 1995 -1998 period took an average of 151,000 trips, of which 68,000 were associated with salmon, 54,000 associated with rockfish and lingcod, and 4,000 were associated with salmon/rockfish/lingcod. The Pacific Council estimates that 50,000 charter boat trips for groundfish would be taken from Cape Mendocino to Southern California—an area that includes not only the Central California ports but also ports such as Fort Bragg. Private boat trips in 2002 are estimated to be 224,000 trips (Table 6-9) Other information developed by the Council on recreational fishing related to the Project area include 2001 estimates of charter vessels—San Francisco 67 and Monterey 33; no estimate was given for Morrow Bay ports.

The groundfish species taken by recreational fishermen are reflected in the 2003-2006 projections made by the Pacific Council.

TABLE 4-25. Estimated California recreational groundfish catch by region in 2003-2006.[a/] (Page 1 of 1)

RLMA	Bocaccio	Canary	Cowcod	Lingcod	Shallow Nearshore Rockfish	Deeper Nearshore Rockfish	CA Scorpion-fish	Black	Widow	Yelloweye	Total
2003											
North	0.0	2.8	0.0	247.1	---	---	---	432.0	0.0	0.9	682.8
Central	0.0	15.2	0.0	652.3	146.0	631.5	0.0	224.3	0.1	2.7	1,672.1
South	10.8	0.2	0.0	100.7	13.9	55.4	87.5	0.0	0.0	0.0	268.4
Total	10.8	18.2	0.0	1,000.1	159.9	686.9	87.5	656.3	0.1	3.7	2,623.4
2004 (No Action)											
North	0	0.7	0.0	33.6	---	---	---	104.0	0.0	0.1	138.4
Central	0.2	6.0	0.3	89.2	71.7	275.5	0.0	60.6	0.2	1.7	505.4
South	56.8	1.0	0.6	26.9	18.1	72.4	61.4	0.0	0.5	0.1	237.8
Total	57.0	7.7	0.9	149.7	89.8	347.9	61.4	164.6	0.7	1.9	881.6
2005-2006 (Council-Preferred with a 24 in. lingcod min. size limit)											
North	0.0	0.5	0.0	34.4	---	---	---	87.0	0.0	0.1	122.0
Central	0.3	7.2	0.3	278.0	---	403.0	---	88.0	0.3	1.6	778.6
South	43.2	0.5	0.3	35.7	---	68.0	---	0.0	0.7	0.0	148.4
Total	43.4	8.3	0.6	348.1	---	471.0	---	175.0	0.9	1.7	1049.0
2005-2006 (Council-Preferred with a 26 in. lingcod min. size limit)											
North	0.0	0.5	0.0	23.9	---	---	---	87.0	0.0	0.1	111.5
Central	0.3	7.2	0.3	193.2	---	403.0	---	88.0	0.3	1.6	693.8
South	43.2	0.5	0.3	24.8	---	68.0	---	0.0	0.7	0.0	137.5
Total	43.4	8.3	0.6	241.9	---	471.0	---	175.0	0.9	1.7	942.9

a/ Projected landings based upon 0.7 Decay Model for season that reflects inseason actions approved by the Council through May 2004. Black rockfish projections for 2004 are reduced to account for no retention in May and September-December in the North Rockfish/Lingcod Management Area (RLMA). Lingcod projections for 2004 are modified to reflect a Nov.-Dec. spawning closure and a 30" min. size and 1 bag limit. Shallow nearshore projections for 2004 are reduced by 2.4 mt (8 mt * 30% contribution from 2003) in the Central RLMA to account for a 50% reduction in bycatch from 2003 due to elimination of the shallow nearshore rockfish sub-bag limit.

Preliminary Analysis of Environmental and Socio-Economic Effects

Summary of Status Quo: The estimated 23 (TNC&EDF) to 29 (NOAA Buyback Estimate) limited entry trawlers who operate in the project area trawl under a series of management measures established by the Pacific Fishery Management Council and NOAA Fisheries. They are delivering collectively about $5-6 million annually in groundfish to about 7-8 major processors of seafood. Current rockfish, flatfish, and roundfish landings are significantly below landings prior to 2000. In particular rockfish landings are about 10-15% of those experienced between 1981 and 1995. Their economic contribution to the Project Area of Ports in terms of employment and income is on the order of 10% of total commercial fishery related income and employment.

Not described previously are the management measures associated with trawling. Project Area trawlers have been affected by bocaccio, canary, lingcod, and cowcod rebuilding plan restrictions as shown above. In addition shortspine thornyhead limits act as a constraint to slope oriented target species. The management measures that Project Area trawlers fish under include trip limits that differ by area and target species, rockfish conservation areas, gear restrictions, required use of vessel monitoring system, and the carrying of at-sea observers as part of a sampling plan that attempts to cover about 20% coastwide of the trawl trips undertaken. These management measures are designed to allow fishermen to harvest the available OYs while minimizing the bycatch and targeting of overfished species. The following excerpts from the 09/21/04 Federal Register Notice: Proposed Rule for 2005-2006 Groundfish Management Measures illustrate the management measures Central California based trawlers are fishing under.

Canary rockfish OY and thornyhead OY are also the most constraining factors for the trawl fishery south of 40[deg] 10' N. lat. Canary rockfish is a shelf rockfish species, like bocaccio, and NMFS expects that management measures to protect canary rockfish will constrain the fisheries such that the bocaccio OY is not achieved in 2005 or 2006. Off the mainland coast of California, the trawl RCA boundaries are similar to those north of 40[deg] 10' N. lat.: bounded by coordinates approximating 75 and 150 fm (137 and 274 m) in January-February and November December, and by coordinates approximating 100 and 150 fm (183 and 274 m) in March-October. Between 40[deg] 10' N. lat. and 34[deg] 27' N. lat., the State of California also prohibits trawling between the shoreline and the 10 fm (18 m) depth contour around the Farallon Islands. South of 34[deg] 27' N. lat., the trawl RCA around islands extends from the shoreline to a boundary approximating the 150 fm (274 m) depth contour. As in past years, groundfish trawling will be prohibited within the Cowcod Conservation Areas (CCAs), defined at Sec. 660.390 through 660.394.

Trawl management measures for flatfish trawl fisheries south of 40[deg] 10[deg] N. lat. are similar to those set for the northern area. Landings limits are higher and the trawl RCA is refined during winter months to allow vessels access to more abundant flatfish stocks during their aggregation period without increasing overfished species catch. Trawlers who operate south of 40[deg] 10' N. lat. requested that the Council develop continental slope species limits that were the same for each two-month cumulative period throughout the year, within the constraints of the shortspine thornyhead OY. Southern area trawlers have less dangerous winter weather than those operating north of 40[deg] 10' N. lat., thus are more able to choose a management strategy of unchanging landings limits within the constraints of overfished species rebuilding requirements. Because management measures that protect canary rockfish will also notably restrict the incidental catch of bocaccio, the Council is allowing some targeting of a healthy stock that co-occurs with bocaccio, chilipepper rockfish. Vessels that target chilipepper with large footrope gear seaward of the RCA or with midwater trawl gear will be allowed higher chilipepper landings limits in May-August 2005.

Taken as a whole, trawl management measures to protect canary rockfish are also expected to provide protections to co-occurring overfished species coastwide. Continental shelf overfished species (lingcod, bocaccio, cowcod, widow rockfish, and yelloweye rockfish) will be protected by RCAs and trip limit structures intended to constrain the incidental catch of canary rockfish. Cowcod will continue to be protected by CCA closures off the Southern California Bight. While lingcod is not yet rebuilt, it is abundant enough that it no longer constrains fisheries for co-occurring species. Trawl limits for lingcod are still at incidental take levels to discourage vessels from targeting lingcod.

Widow rockfish will also benefit from some management measures to protect canary rockfish; however, widow rockfish is commonly taken in midwater trawl fisheries and requires additional protective management measures. Coastwide, landings limits for

> continental shelf rockfish are kept at incidental levels for bottom trawl gear, except for the chilipepper opportunity described earlier…..
>
> Management measures for 2005 and 2006: Bocaccio is a shelf species that is most commonly found from 54 fm (99 m) to 82 fm (150 m) of water over the shelf. Bocaccio have historically been taken in the commercial trawl and fixed gear and recreational fisheries. To reduce bocaccio bycatch, fishing opportunities in the depths where bocaccio are most commonly encountered have been reduced though the use of RCAs cumulative trip limits, and gear restrictions.
>
> RCAs will continue to be used in 2005 and 2006 to restrict fishing on the shelf. Because bocaccio are more frequently caught by fixed gears in waters off the central California coast, proposed closures for the non-trawl fleet are more broad in this area. Off California, trawling for California halibut, and sea cucumber is prohibited within the trawl RCA. Pink shrimp trawling will be allowed within the RCA providing the vessels use state required finfish excluder devices Ridgeback prawn trawling will south of 34[deg] 27' N. lat. will be constrained by an RCA between boundary lines approximating the 100 fm (183 m) and 150 fm (274 m) depth contours throughout the year.
>
> NMFS expects that management measures to protect canary rockfish will restrict the incidental catch of bocaccio and keep it well below the OY. Because of this, the Council is allowing some targeting of the co-occurring chilipepper rockfish stock. Vessels that target chilipepper with large footrope gear offshore of the RCA or with midwater trawl gear will be allowed higher chilipepper landings limits in May-August. Only minimal levels of bocaccio retention, to accommodate incidental catch, will be permitted.

The footrope requirements mentioned above were designed mainly to minimize bycatch of overfished species. However these footrope restrictions may have an indirect effect on protecting habitat. In the associated EIS for the 2005-06 regulations: ‘ 2005-2006 Pacific Groundfish Fishery Harvest Specifications and Management Measures” the following discussion under Chapter 3.3 is germane

> Ecosystem effects are, almost by definition, indirect. Overfishing has reduced some fish stocks to levels that are a small fraction of estimated unfished biomass and may affect trophic relationships: these species are less available both as prey and predators. Direct effects to habitat result from the deployment of fishing gear that damages benthic habitat. Habitat modification can also have indirect ecological effects because different species may be better adapted to the altered habitat, displacing other species. Bottom trawl footrope restrictions implemented by the Council, which would apply under all the alternatives, make it difficult for fishers to access rock piles and other areas of complex topography (due to the risk of gear damage) In general, potential bottom trawl fishing-related impacts to groundfish habitat take the form of lost or discarded fishing gear and direct disturbance of the seafloor from contact by trawl nets. While the effects of fishing on groundfish habitat have not been directly investigated, there is some research

exploring how gear affects habitat. Auster and Langton (1999) reviewed a variety of studies reporting habitat effects due to fishing for a wide range of habitats and gear types. Commonalities of all studies included immediate effects on species composition and diversity and a reduction of habitat complexity.

Over next few years, it can be expected that the Council and NOAA will be likely to institute additional measures that will affect trawling in the project area:

Implementing other habitat protection measures through this EIS

Undertaking additional management measures to reduce bycatch

Implementing a trawl ITQ program

Undertaking new management measures that respond to the results of the 23 new groundfish stock assessments that will be produced over the next few years.

Working with NOS to regulate fishing in federal marine sancturaries.

Implementing protective measures to deep sea corals

Effects of the Alternative on the Status Quo

Analyzing the potential effects of this alternative will be difficult, even after the TNC&EDF negotiations with the industry and the Council have provided more focus and specifics on the alternative. In addition to the level of uncertainty about the amount of habitat damage from trawling and the effects of trawling on habitat and on groundfish and non-groundfish organisms, there will still remain a high degree uncertainty about what happens inside and outside the reserves with respect to effort, catch, yield, and habitat function. The following comments provide some context to the issue:

In trying to analyze potential effects upon habitat from various proposed alternatives associated with the 2005-2006 Pacific Groundfish Specification and Management Measures, the Pacific Council states, among other things, “that impacts of fishing gear on different types of habitat are not well understood;” “that there is limited data on the distribution, intensity, and duration fishing effort associated with the groundfish fisheries;” and that direct effect of fishing is to “remove fish from ecosystems…affecting ecosystem structure…..”

3.2 *Criteria Used to Evaluate Impacts*

The proposed action will directly and indirectly affect the level of fishing activity, which—to the degree certain types of fishing gear adversely affect EFH—could result in differential impacts among the alternatives. Increased fishing effort could lead to an increase in fishing-related impacts, while a decrease in fishing effort would have the opposite effect. Thus, changes in fishing effort could be one way to evaluate the relative effects of the alternatives. However, there are limited data available on the distribution, intensity, and duration of fishing effort associated with the groundfish fisheries.[1/] Furthermore, different gear types have different kinds of impacts to habitat, although bottom trawl gear is likely to have the greatest impact because of its extensive contact with substrate. The effects of fishing gear on different types of habitat is not well understood either. For example, in high energy environments (e.g., strong wave action or currents) the relative effect of fishing gear may be modest compared to more stable, low energy environments. Currently, there is insufficient information to fully evaluate the effects of the proposed action on EFH.

Impacts of the proposed action at the ecosystem level are at least as difficult to predict. The direct effect of fishing authorized under the proposed action is to remove fish from ecosystems. This may change the relative abundance of species at different trophic levels, affecting ecosystem structure, and contributing to follow-on indirect and cumulative effects. However, the nature, intensity, and location of these effects are not well understood, especially across the range of marine ecosystems potentially affected by changes in the abundance of harvested groundfish species.

In its White Paper the SSC, among other things, emphasizes the need to understand the shift in effort but there is "limited information and high degree of uncertainty inherent in addressing the effects of displacement."

One effect common to virtually all reserve proposals is effort displacement. If a reserve is placed in an area where few fish have traditionally been harvested, then few fishers will be affected by the presence of the reserve and there is likely to be little displacement of fishing effort. However, if a reserve includes historically productive fishing grounds, which seems the more likely scenario, the fishers who have previously been able to operate on those grounds will either have to cease fishing or shift their operations to other fishing grounds. This displaced effort could result in increased exploitation of the fishing grounds outside the reserve and increased competition and social conflict among the fishers operating there. The SSC is aware of the limited information and high degree of uncertainty inherent in addressing the effects of displacement. However, given the need for managers to consider whether closer monitoring and/or additional regulation are needed to address such effects, this issue cannot be ignored. The size of the closures considered in the Council's 2003 groundfish specifications warranted extensive consideration of this issue, including more restrictive regulation outside the closed area. Not all reserve proposals will necessarily warrant changes in monitoring or regulation outside the reserve. However, this cannot be determined without some evaluation of the potential extent of displacement.

The SSC also states that "The body of empirical studies on West Coast reserves is limited and not definitive in terms of yield effects."

Conclusions drawn from theoretical models of adult or egg/larval export regarding the effect of reserves on fishery yield are sensitive to the assumptions underlying the models. The applicability of models to particular fish stocks is generally known only in a qualitative sense. For purposes of quantitative fishery management, detailed life stage modeling is less relevant than establishing an empirical relationship between reserves and yield outside the reserve. The body of empirical studies on West Coast reserves is limited and not definitive in terms of yield effects. Rather they focus on whether increases in fish abundance and size occur inside reserves. Increases in yield cannot be inferred solely on the basis of increased abundance inside the reserve.

The *status quo* in reserve proposals must pertain to the specific fishery for which reserves are being considered, as the details of that fishery matter a great deal to the conclusions that can be drawn. For instance, if the *status quo* is an overexploited fishery, reserves may enhance fisheries yield. However, if the status quo is a fishery that is being managed close to the level at which maximum sustained yield (MSY) is achieved, it is not clear that reserves can enhance yield. Theoretical studies evaluating effects of reserves on fishery yield outside the reserves produce differing results, depending on model assumptions (Hastings and Botsford 1999, Mangel 2000, Neubert 2003).

The TNC&EDF proposal raises uncertainty about total catch by remaining trawlers:

> "Fate of fish "released" through buyout unclear: If all of the fish that was caught by the bought-out trawlers were re-allocated to remaining trawlers, this might compensate for reduced trawlable area; however, it may not be possible for the trawlers remaining in the project area to catch all of this allocation due to the reduced area available for trawling. In addition, if the re-allocated fish were caught somewhere else, this would reduce supply to local processors."

Yet, the TNC&EDF are providing a means to undertake research and reduce many of these uncertainties:

> "Another important project objective is to be able to scientifically evaluate the ecosystem recovery process, if any, by monitoring, observing and documenting what happens to the benthic habitats, and the biodiversity they support, post-trawling. In discussions amongst industry participants and conservation groups, it is clear that both camps distrust the "science" of the other side and this sticking point has been a major impediment to moving forward on an acceptable management plan for groundfish. This proposal, if successful, will provide a unique "living laboratory" for scientific research opportunities aimed at objectively determining the impacts, if any, on dragging the seafloor in the Central Coast of California."

Short term effects.

Total Catch and Effort

The primary short term effects will be to reduce the project trawl fleet by at least 13 trawlers and to create open and closed areas for bottom trawling for groundfish. These effects will then influence total catch and the location of total catch, total effort and the location of effort, reduce potential bottom trawl damage to existing fishing grounds, and prevent bottom trawling from entering into areas within the Project Area that have not been fished before.

Under the current trip-limit regime, the landings of the 91 buyback vessels that were retired in 2003, were redistributed to the remaining vessels through higher trip limits. Unless the Council chooses to modify current regulations in order to "bank" the associated landings of the 13 or more trawlers that TNC&EDF may buyout, then total landings of groundfish will not be changed significantly from the status-quo. Assume that the status quo fleet consists of 26 trawlers and that the TNC&EDF buy 13 of these trawlers. The remaining fleet will be able to fish in the open areas for the same amount of catch as the status quo fleet; except they will be able to fish trip limits essentially twice the size as the Status quo fleet. Correspondingly, depending on what project areas are left open to fishing, effort may shift into other areas north or south of the project area.

However the remaining fleet will be fishing in less area than the Status Quo fleet. Through the negotiations process, it can be expected that current relatively high catch-per-unit-of- effort (CPUE) grounds will become closed, leaving, on average, lower CPUE grounds open to the post-buyback fleet. However, CPUE is also influence by the amount of vessels fishing in a particular area. With fewer vessels fishing the same areas, CPUEs may increase. However, as indicated by TNC&EDF, the areas of fishing may be small enough that remaining project area trawlers cannot catch the amount of fish that is typically harvested in the project area. In this instance, given current Council processes, such limitations would be recognized and where possible, trip limits in areas outside the project area would be presumably increased. It should be noted that with fewer vessels, it may be easier to design trip limits that minimize the potential take of overfished species.

If total catch is unlikely to be changed, the ability of the groundfish fishery to repay the loan associated with 2003 Buyback Program is unlikely to change. This loan is based on assessing a landings fee on ex-vessel revenues. Unchanged landings imply unchanged revenues. All that may happen is a shift in catch - and thus revenues - from project area to other areas. Should the Council adopt an IFQ system, then some amount of fish could be banked by TNC&EDF. In so doing, total catch and effort would decrease accordingly and correspondingly, the amount of trawling in the remaining open areas.

Pristine Groundfish Habitat, Trawled Groundfish Habitat, Habitat Important to Non-Groundfish Species.

This alternative will protect those untrawled habitat areas from future trawling. It will close some portion of the trawled areas to future trawling. Remaining vessels will be fishing in a

smaller portion of the project area. As with trying to assess tendencies with respect to total fleet effort and CPUE, it will be difficult to assess how much habitat damage is being prevented in the existing trawled areas. The comparison is between 26 vessels fishing in more dispersed areas to a set of 13 vessels fishing in more concentrated areas. It might be presumed that the negotiations will focus the remaining vessels into areas that are already heavily damaged by trawling--so much so that these areas might never recover from trawling even if they were closed.

Primary Socio-economic Effects.

As stated by TNC&EDF it is difficult to assess the financial costs and benefits to various user groups as a result of this alternative, particularly if the number of permits/vessels purchased though the Buyback is unknown--So qualitative comments that provide a sense of the relative impacts are provided.

"Since the no-trawl zones would be sited through a participatory process aimed at minimizing socioeconomic costs and maximizing conservation benefits (and because we do not have access to confidential trawl track information), we cannot provide an accurate appraisal of these costs and benefits at this time."

Project Area Groundfish Trawlers: Those participating in the Buyback would obviously benefit from this alternative, as participants would not agree to leave the fishery unless financial remuneration was in their favor. The remaining Project Area Buyback vessels would benefit from the revenues associated with larger trip limits and less competition on the fishing grounds, but would also see their costs rise as they are shifted from higher CPUE grounds to lower CPUE grounds, perhaps fishing grounds further from port. If the number of vessels and area fished affects the CPUE—it is unclear how CPUE will change as there will be fewer vessels (positive effect on CPUE) but a small amount of area to fish (negative effect on CPUE.)

Non-Project Area Groundfish Trawlers: Should any of the Project area catches be transferred to outside the area through redesign of trip limits, non-project area groundfish trawlers may benefit. On the other hand, Project area trawlers may transfer their effort to other ports causing more competition on non-Project area grounds.

Other fishing groups: Since these groups will be able to fish in the reserves, they will have less competition for the available species of fish found within the reserves. Other fishing groups may benefit from the availability of excess vessels and equipment should they not be scrapped. However, depending on the contract with TNC&EDF, participants in the Buyback could take their payments purchase state permits to fish other species of fish such as shrimp or crab. This was a common complaint with the 2003 Groundfish Buyback Program.

Processors: If total catch remains the same, the flow of product to the plants should remain the same. If the reserves cause harvesting costs to increase and if the Buyback reduces the amount of vessels that are able to supply the plants, ex-vessel prices may increase as a result. Scheduling of deliveries may be problematic with a reduced number of vessels. If the Buyback results in a significant number of vessels being purchased, the Processors will have to make the choice to

continue processing, offering higher prices to bid trawlers from outside the project area to relocate into their port, or purchase limited entry trawler permits themselves to guarantee an adequate supply of fish.

Fishing crew and Processing labor. With a reduction in the number of trawlers, fishing crew will become unemployed. Processing labor may be similarly affected if the total amount of fish landed is reduced or processors choose to close the plants. Any negative effects will be counterbalanced by TNC&EDF's willingness to offer some level of mitigation:

> "Bearing in mind that the buyout that we are proposing would, in and of itself, greatly reduce economic impacts arising from no-trawl zones in the project area, both TNC and Environmental Defense are committed to soften the impact of shifts and consolidations in the industry that may result from the implementation of our project. We will encourage companies and fisherman who may be the beneficiaries of the private buyback to give due financial consideration to employees who may be terminated; and likewise, we will do the same and consider some type of severance and/or training programs to assist in their transition to another job or career. Vessel crews, processing employees, skippers and other industry employees will be considered for assistance."

Communities and Ports—As indicated by TNC&EDF communities may lose revenues from trawling and funding for harbor activities but potentially gain from increase activities by other gear groups and by the potential for ecotourism.

> There may be for some portions of citizenry, an increase in Existence value, option value, and heritage value of no-trawl zones would be enhanced. The following excerpt from the EIS for the 2005-2006 groundfish specifications EIS gives the Pacific Council's perspective on these issues:

8.1.5.2 Consumptive versus Nonconsumptive Activities

The sectors benefitting from a resource can generally be placed into one of three groups: consumptive users (e.g., recreational fishers, commercial harvesters, and processors), nonconsumptive users (e.g., wildlife viewers), and nonusers (e.g., members of the general public who derive value from knowing that a species is being maintained at a healthy biomass level). The following table displays the general relationship between use/non-use and consumptive/nonconsumptive types of activities.

Relationship between Use/Nonuse and Consumptive/Nonconsumptive Activities

	Consumptive	Nonconsumptive
Use	Commercial and Recreational Fishing, Processing.	Wildlife Viewing
Nonuse	N/A	Existence Value, Options Value, Bequeathal Value

In economic terms, renewable resource management entails a fundamental tradeoff between current and future costs and benefits. When management needs call for a substantial reduction in allowable harvests, additional costs may be born by the direct consumptive users, who may be left with much smaller harvests than they had been accustomed to. While this near-term sacrifice may create much greater harvest opportunities in the future once the stock has been replenished—depending on the duration of the rebuilding period—many fishers and processors may be unable to weather a long down period, opting instead to go out of business.

Nonconsumptive users may benefit from the use and nonuse values provided by the resource. Wildlife viewing and the derivation of secondary benefits from ecosystem services are examples of non-consumptive use values. One or more of the following nonuse benefits may accrue from the preservation of fish stocks at higher levels of abundance: (1) existence value derived from knowing a fish population or ecosystem is protected without intent to harvest the resource; (2) option value placed on knowing a fish population, habitat, or ecosystem has been protected and is available for use, regardless of whether the resources are actually used; and (3) bequeathal value placed on knowing a fish population, habitat, or ecosystem is protected for the benefit of future generations. Offsite nonconsumptive uses of resources are public in nature in that no one is excluded from deriving the identified benefits, and one person's enjoyment does not affect another's potential benefit.

The existence of coastal fishing communities in themselves may have intrinsic social value. For example, the Newport Beach (California) dory fishing fleet, founded in 1891, is a historical landmark designated by the Newport Beach Historical Society. The city grants the dory fleet use of the public beach in return for the business and tourism this unique fishery generates.

Value may also be placed on biological diversity. The value of biological diversity may be part of the total value placed on a site by nonconsumptive users (onsite or offsite). Three levels of biological diversity have been identified, (1) genetic diversity within a species, (2) species diversity (richness, abundance, and taxonomic diversity), and (3) ecosystem diversity. Ecosystem diversity encompasses the variety of habitats, biotic communities, and ecological processes (Caribbean Fishery Management Council 1998). Healthy ecosystems characterized by high biological diversity are generally able to provide a wider range of ecosystem services than are available from damaged or less diverse ecological communities. Examples of

such ecosystem services include the nutrient recycling and filtering capabilities of wetlands, and the CO_2 sequestration function provided by the ocean (which is an important carbon sink).

The total societal value placed on offsite nonconsumptive use of a stock or component of the ecosystem will also depend on: (1) the size of the human population, (2) the level of income, (3) education levels, and (4) environmental perceptions and preferences (Caribbean Fishery Management Council 1998).

The above relationships imply that as human populations and the affluence of those populations increase, and as fish stocks and their ecosystems are depleted, nonconsumptive values associated with maintaining ocean resources are likely to increase. Another implication of these relationships is that once the basic integrity of ecosystem processes and marine fisheries components are preserved, the likely additional benefit from incremental increases biomass will decrease.

Fisheries Management and Enforcement

TNC&EDF state:
"Conceptually, large no trawl zones should present no significant new law enforcement or compliance challenges. They could be enforced in the same way as other closed areas. Compliance should increase as Vessel Monitoring Systems are introduced and finalized into the fleet as planned. Enforcement capacity has been enhanced in other National Marine Sanctuaries through the cross-deputization of agents from several enforcement bodies at the state, regional and federal levels. "

While VMS is a good system, the costs of monitoring will go up because in addition to monitoring the rockfish conservation areas and existing marine reserves, enforcement officials will now have to monitor an additional set of marine reserves. It is presumed that fewer, larger, and more straight lined the proposed closed areas are, the lower the enforcement costs will be.

While the proposed set of marine reserves may add extra burden on fisheries management, they could also ease management burden if they reduce need for the rockfish conservation areas or adjustments in the rockfish conservation areas. Reducing the number of participants in the groundfish fishery may make allocation decisions and trip limit decision easier, while also reducing the need for area specific in-season adjustments.